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ABSTRACT

A project developed a resource to inform and support the information and communications technology (ICT) training process. Its target audience were directors of small and medium-sized enterprises and those responsible for developing ICT use within a company or for managing staff training. The project gathered information from previous experience, a literature review, and reports; developed the resource on CD-ROM and produced a version to pilot; and piloted with business users and evaluated outcomes. The resource was organized into 10 interrelated sections. Each section was introduced by an audio commentary and had subsections consisting of one or more text screens. The sections were introduction, planning, evaluation, modes of delivery, six case studies, summary, needs analysis, change in practice, glossary, and references. Data for evaluation of the pilot CD-ROM were completed questionnaires from 19 business users. Eighteen described their use of ICT in a personal context as being well developed or reasonable; four users described their business use as well developed. Views were mixed regarding navigation around the resource. No consensus was reached as to which aspect was most worthwhile. All saw modes of delivery as interesting and useful. Issues arising from development and use of the resource related to the value of case studies; transferability of good practice; and teamwork. Recommendations were made for enhanced interactivity and further development of sections the business community saw as particularly useful. (Contains 26 references) (YLB)

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Ensuring Effectiveness of ICT training

Report and Evaluation 1999

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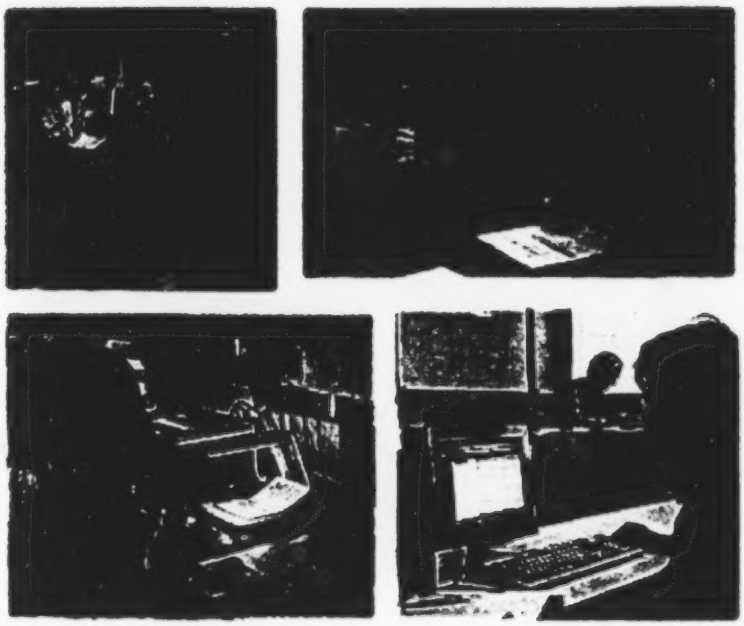
Ensuring Effectiveness of ICT Training



Report and Evaluation 1999

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Michael Still	Magnetic Fish

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Ensuring Effectiveness of ICT Training: A Report and Evaluation

Introduction

Ensuring Effectiveness of ICT Training is a pilot study and resource to inform and support the training process. The resource has a target audience of directors of small and medium sized enterprises, those with a responsibility for developing the use of information and communications technology (ICT) within a company, and those managing staff training. It highlights issues which are important to address if the objectives of the ICT development and training are to be achieved.

Background research was undertaken and the resource developed to this pilot stage by the Telematics Centre at the University of Exeter School of Education, working collaboratively with the Residential Estate Agency Training and Education Association (REATEA). The project was undertaken as an outcome of previous work in this area, in particular Training and Assessment: Insuring IT Competence (Davis, 1998). Other organisations and companies also contributed to the work, including the University of Reading, West Berkshire Educational Business Partnership, Magnetic Fish and a number of other companies who were involved in the trial and evaluation of the outcomes of the project. The work was undertaken as part of a University of Exeter project supported by the European Social Fund.

This report outlines the context for the report, the research on which it was based, the methodology used and an evaluation of a prototype of the resource which was piloted in December 1998. The evaluation is based on data collected from trials with 24 users in local business, as well as analysis and comment from the development team and members of the business community to whom the resource was demonstrated.

Context

The need for a better understanding of the training process is widely accepted and has been the focus of workshops, seminars and research articles (see, for example, Caley & Hendry, 1998; Jones & Robinson, 1998). Whilst some very effective examples of ICT training can be cited, such examples may be outweighed by the amount of 'IT training' where outcomes do not live up to expectations. This situation is not restricted to any one sector, probably being equally evident in business, education and industry.

There is widespread recognition that training is part of any ICT development process, and increasing acknowledgement that more than just training and purchase of equipment are required if business results are to be achieved from investment in ICT development. The education sector is currently addressing this matter through a major initiative 'ICT Training for Teachers and School Librarians', supported by the National Lottery New Opportunities Fund.

Staff at the Telematics Centre at the University of Exeter have considerable research and practical experience in many aspects of ICT training. Over the last few years, they have built on this work by developing commercial partnerships in order to understand the

needs and practice of the business community, and to research the transferability of the education experiences. REATEA, through their role as a national training association, have also been looking specifically at the issue of ICT development and the associated training needs. Since leading the 'Technology in Estate Agents' research and evaluation, and playing a lead role in the Insuring IT Competence initiative, they are now producing an 'IT Guide' with accompanying CD ROM for the industry (REATEA, 1999).

Ensuring Effectiveness of ICT Training is an outcome of this work. The Telematics Centre undertook a summary evaluation of the Insuring IT Competence project, which was the forerunner to this project (Davis, 1998). This work and the report of IT use in the Estate Agency (REATEA, 1997) set a target and standard for this resource. Other work which was particularly significant in this project was a series of workshops and discussions about models of training with Microsoft, ICL, Granada Learning, Network Solutions and Pearson's Publishing. These were undertaken in the context of developing a collaborative model of effective ICT training to schools. As most people involved in these workshops were from the business community, it provided a valuable forum through which to consider different models of the training process and its component parts. The project also ran in parallel to the development of the 'IT Guide', a handbook developed by REATEA for Estate Agents (REATEA, 1999).

Project methodology

The project methodology consisted of:

1. Gathering information from previous experience, a review of the literature (articles and reports published on paper and electronically) and from a series of meetings with representatives from business and commerce.
2. Producing a framework and storyboard for the resource through a series of four workshops, interspersed with individual writing.
3. Designing a user interface and identifying images required.
4. Selecting and representing case studies.
5. Capturing images, moving video and audio.
6. Developing the resource on CD ROM and producing a version to pilot.
7. Piloting with business users and evaluating the outcomes.
8. Production of project report and dissemination to a wider audience through publication.

Formative evaluation undertaken by the project development team, working closely with REATEA, spanned and informed the entire development process.

Overview of the resource

The resource is organised into a number of inter-related sections and sub-sections. Each section is introduced by an audio commentary and has sub-sections which consist of one or more text screens, some with active links to other parts of the resource. Many are supported by images and additional sound clips.

The *Introduction* poses a number of questions: What is ICT? Why ICT training? What about Health and Safety? What costs? What process? At this stage users are provided with a diagram to illustrate the training process visually (see Figure 1).

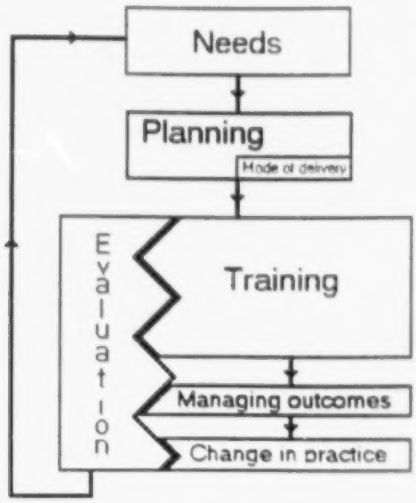

Figure 1: The Training Process

Planning has sub-sections entitled:

- Training objectives
- Targeting training
- Mode of delivery
- ICT issues
- Support
- Preparing for training
- Planning for change

Evaluation has sub-sections entitled:

- Why evaluate?
- Monitoring change
- Post training feedback
- Evaluating the training process
- Managing the outcomes
- Identifying changes in practice

Modes of Delivery has sub-sections entitled:

- Face to Face Training
- Distance Learning (see Figure 2)
- Strengths and weaknesses (see figure 3)
- Models for Training

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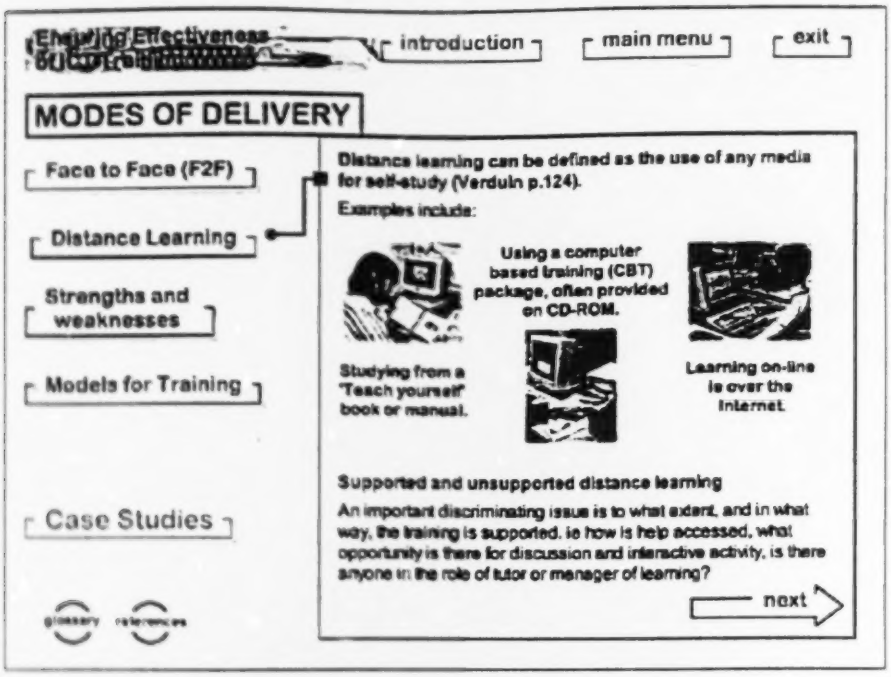
introduction
main menu
exit
MODES OF DELIVERY
Face to Face (F2F)
Distance Learning
Strengths and weaknesses
Models for Training
Case Studies
Distance learning can be defined as the use of any media for self-study (Verduin p.124).
Examples include:
Using a computer based training (CBT) package, often provided on CD-ROM.
Studying from a 'Teach yourself' book or manual.
Learning on-line ie over the Internet
Supported and unsupported distance learning
An important discriminating issue is to what extent, and in what way, the training is supported, ie how is help accessed, what opportunity is there for discussion and interactive activity, is there anyone in the role of tutor or manager of learning?
next

Figure 2: Modes of Delivery: Distance Learning

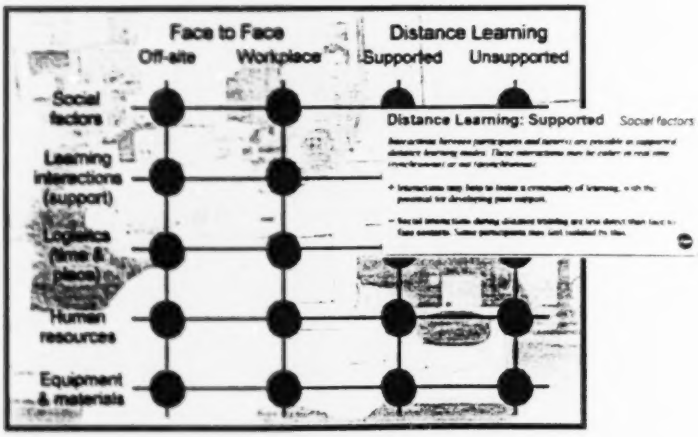

Figure 3: Strengths and weaknesses provided on the CD ROM as an interactive grid

There are six *Case Studies*:

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- Applying communication technology in SMEs (actS); a WWW based course for the business community in the use of communications technology.
- Support action to facilitate the use of video conferencing in education (saVie); a course in video conferencing for businesses.
- South Bristol Learning Network (SBLN); a case study showing how a small business, the Badminton Villa Hotel, developed ICT skills and applied them to their own context through a training opportunity with SBLN.

- UpGrade media and training services (UpGrade); an example of a bespoke course provided to Devon and Cornwall Careers by UpGrade, a University-based business.
- The Virtual Study Centre (VSC); an example of an on-line environment set up and resourced for collaborative learning with tutor support.
- RATIO (Rural Area Training and Information Opportunities) is an example of a how anyone can use the facilities of a 'drop in' centre to follow an accredited IT course.

For each there is an overview, key features, a training description and a showcase. The *Summary* contains sub-sections entitled:

- attitude and commitment
- integration into the workplace
- training structure and commitment
- business plan
- evaluation

The *Needs Analysis* section has summary remarks and a list of characteristics of a good needs analysis.

The *Change in Practice* section contains summary remarks.

The *Glossary* is limited in breadth at this stage as it illustrates an approach; it incorporates some audio linked to sequences of still images.

The *References* section provides WWW site addresses and references to articles and reports.

The pilot study

The evaluation of the pilot CD-ROM was informed by three sources of data:

1. Feedback from questionnaires completed by business users who piloted the resource in their workplace.
2. Comments collected during demonstration to members of the local business community.
3. Reports from the development team.

The responses of the first group form the basis of the analysis in this section. The second and third of these sources are viewed as formative evaluation which was used mainly to inform the development of the pilot CD-ROM.

Copies of the resource were given to 24 people from local business, together with an overview sheet and questionnaire (see Appendix). The questionnaire asked users about:

- the level of their personal use of ICT
- the level of their use of ICT in business

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- the ease of use of the resource
- the usefulness of sections in the resource
- the most worthwhile and least interesting parts of the resource
- suggestions for changes or developments

The Telematics Centre and REATEA were both involved in setting up and conducting the pilot study which comprised 12 people from within the estate agency profession and 12 from other businesses. The resource was sent initially to the 'mixed business' group and later to the estate agents. The two-staged approach was to ensure the trial was undertaken at a time when people would be able to give some priority to using the materials. For the group of Estate Agents, this was a one month period leading up to their quarterly steering group meeting which was extended to incorporate a 'post-trial workshop' to discuss the issues and collect additional comment.

Outcomes

Nineteen users returned completed questionnaires. Of these, all but one described their use of ICT in a personal context as being *well developed* or *reasonable*. The use of ICT in the business was generally lower. There were only 4 users who described their business use as well developed. In only one case did someone report the ICT use in their business as being better developed than their own personal use. It was interesting that this one case was that of a user who described themselves as having *quite limited* personal use of ICT, but felt the business use was *well developed*. Others in the same office described the ICT use in the business as *quite limited*.

Twelve of the users testing the resource with no previous viewing or support, said that the resource was *easy to use*, with the remaining 5 who responded to that question saying *mostly OK*. The interface was described as being very "clean" with generally good-quality images, sound and text. Some users reported technical difficulties in getting the sound and video to play.

The navigation around the resource prompted comment and discussion. Views were mixed as to whether there should have been a clearer and more structured route or additional links between sections. One user noted that only some pages had a *previous* arrow. This was felt to be helpful, and it was suggested that a *next* arrow could also be offered for those who preferred to follow a pre-defined route.

Various sections caught the interest of users in response to being asked for the aspect of the resource they found *most worthwhile*, but there was no real consensus of views. Several users said that they particularly liked the visual style of the health and safety sub-section, and all but three respondents referred to this section as *interesting and useful*. There was keen interest in the health and safety section in the post trial workshop to the extent that the project team were invited to develop this section further for inclusion on the CD ROM being developed as part of the 'IT Guide for Estate Agents'.

Modes of delivery was seen by all as interesting and useful with the strengths and weaknesses grid singled out in several cases for positive comment. It became evident in

post-trial discussion that not all users had appreciated the interactive nature of the grid, and it was noted that this needed to be made clearer.
Case studies were popular, and it was suggested that the case studies were most useful when they were written from the client's angle, as the South Bristol Learning Network (SBLN) did through the proprietors of the Badminton Villa Hotel. There was a call for more case studies or references to existing good practice.

The question regarding the section *of least interest* was not addressed by all respondents. Of those who did respond, *Measuring Change* was noted by two users and *planning and evaluation* were each noted by one user.

The importance of needs analysis in the training process was referenced by two people who felt this section could be developed further, possibly with some structures included for audit tools etc.

In general the sections which provided a 'multimedia' approach, i.e. incorporated images and sound, were preferred to those with a text-based approach. Several people commented on this aspect in discussion or through the questionnaire and asked for more use of video.

The final question invited comment regarding suggested changes or future development. A summary of the responses is given in the table below.

Comments from the section 'other comments' regarding changes or developments
Concentrate on the target audience
Expand the glossary
Increase the use of multimedia
Perhaps more videos as these always maintain attention span
Main menu could be flagged up more initially
Some topics had a 'previous' arrow. This would be handy throughout
Instructions on moving between screens not always easy to find/follow
What about a 'print this page' option?
Summary doesn't shout out enough
You could have tiny samples of case studies in text and sound flags to give a hands on descriptive feel for those who still need to be persuaded, or to whet the appetite
On the first day I had sound and then had an error message .....
Technical problems like video and sound
Opportunity to hyperlink to http://www.ratio.org.uk etc
Face to Face and Distance learning need separate screens
Needs analysis to give indication of competencies/ICT skills relative to job profile
More case studies referenced to good practice
It would be useful to have links or references to relevant courses for trainers and relevant ICT courses for trainees
Have more of it interactive
Concentrate on the target audience
Provide updating service

Table 1 Responses from 'Suggested changes or developments'

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Issues arising from the development and use of the resource

In earlier developments at the Telematics Centre, the importance of context or the situational dependency of multimedia has been acknowledged. Users of multimedia resources bring with them unique experiences and have different expectations. Although these variables can never be wholly accommodated, multimedia designed for educational applications can be targeted at specific courses and structured to meet pre-determined, collectively agreed objectives (Dillon *et al*, 1999; Tearle *et al*, 1999).

The *Ensuring Effectiveness of ICT Training* resource was designed to support occupational learning; that is, learning which takes place at work. The workplace is a complex arena and although it is an educational setting in the broadest sense, in many fundamental respects it is different from formal educational environments and presents different challenges for the design of multimedia.

The workplace is characterised by a number of different forms of knowledge; Blackler (1995) has suggested the following (see also Saunders, 1998):

- embrained knowledge, which is dependent on conceptual skills and cognitive abilities
- embodied knowledge, which is action-orientated and likely to be only partly explicit. It is knowledge of "how we do things here"
- encultured knowledge, which refers to the process of achieving shared understandings; it is language-based, socially constructed and negotiable
- embedded knowledge, which resides in systemic routines, roles and formal procedures
- encoded knowledge, which is information conveyed by signs and symbols

These forms of knowledge usually have an especially high level of situational dependency. There is tremendous variation from company to company in how things are done and in formalised and encoded routines and procedures. Each company has it own 'culture', that is, shared knowledge, beliefs, ways of acting and norms governing social interaction (Saunders, 1995). Not only may the culture of one company be very different from that of another operating in the same sector, it may also have a commercial sensitivity and be subject to levels of confidentiality absent from the formal educational environment.

For these reasons, multimedia which is designed to have widespread and open applications in occupational learning has to be based on generic rather than specific content and to focus primarily on processes. There is a paucity of such resources (Davis, 1998); companies which have very specific operational training needs normally commission bespoke materials. The *Ensuring Effectiveness of ICT Training* resource thus focuses on the generic elements of ICT training. It has at its core a process model which starts with needs which inform planning and decisions about mode of delivery, which in turn determine the form of training and the method of evaluation, particularly of managing outcomes and monitoring change in practice. The outcomes of the evaluation feed back into the analysis of needs. These processes are common to most commercial training situations.

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Individuals from different backgrounds bring with them different assumptions about what constitutes 'quality' and often unconsciously apply these when making judgements about current activities (Scott, 1996). During the pilot there was no consensus about the most and least useful sections of the resource, but the importance of a needs analysis in the training process was stressed and the section on *Modes of Delivery* was seen by all as interesting and useful. The lack of a consensus view about the most and least useful sections is partly a reflection of the diversity of business cultures explained above. However, it also reflects a similar situation in higher education where people make individual and often highly specific choices about how they manage information (Dillon, 1998).

Typically, there is a difference in the value placed on case studies by business and educational users. This is partly a matter of context and personal relevance (see above) and partly a reflection of real cultural differences between educational and corporate training environments and their goals (Weller & Dillon, 1999). One business user in the pilot viewed the Virtual Study Centre, although not used exclusively by education, to be 'educational' and thus wondered if it was relevant to business users. This was included after some debate in order to provide an example of an on-line learning environment. It was felt that many users of the resource would be unfamiliar with such a concept. It is therefore relevant to note that whereas the *values* of commerce and education are profoundly different and incommensurable (Tasker & Packham, 1993), some of the theories of learning which have been influential in education and multimedia development in recent years, including Kolb's theory of experiential learning (Sadler-Smith, 1996), Schön's concept of reflective practice (Thorpe, 1995), the notion of mastery learning (Palardy, 1993), the notion of situated cognition (Brown *et al.* 1989; Lave, 1996) and Pask's conversational theory (Pask, 1976; Laurillard, 1995), have their origins at least in part in commercial settings. The *Ensuring Effectiveness of ICT Training* resource uses case studies drawn from business and educational settings, including education providing businesses with training solutions, and focuses on the common concerns by drawing on examples of best practice from both sectors.

Good practice in ICT is transferable from one sector to another but only if context is not allowed to get in the way. However, in the absence of measurable outcomes which relate directly to the commercial interests of a company, ICT training is rarely valued (Davis, 1998). This is a common problem; Boucher (1998) noticed a similar reluctance on the part of senior managers in higher education institutions to recognise the value of transferable skills in ICT if they cannot be equated with efficiency gains in administration and teaching or research output. (Skills in this sense carries a positive connotation of competence, of practical knowledge combined with ability [Eraut, 1994]).

Teamwork is another important non-quantifiable benefit arising from collaborative multimedia development (Dillon *et al.* 1998), in this case between personnel in the Telematics Centre working in partnership with members of the local business community. Teamwork is good for the development of products, and the process of collaboration results in shared skills and expertise and provides fertile ground for the

emergence of new ideas and perspectives. One key outcome of the project was the collaboration between education and business. Two of these links are likely to lead to further collaborative ventures. Campbell *et al* (1995) note that inter-institutional collaborative partnerships are, by definition, alternative approaches to solving problems or improving practice, and as such are innovative in their own right. They also note that collaborative partnerships quite often 'evolve' in response to sudden opportunities that are available for limited periods of time.

Users have high expectations of multimedia; they judge audio-visual material by broadcast standards and interactivity by the standards of commercial software. They have low tolerance of material which falls short of these expectations. A strength of *Ensuring Effectiveness of ICT Training* is the way it uses multimedia techniques developed from earlier projects within the Telematics Centre. The value does not lie merely in exemplifying the use of ICT in education and training, but also in showing processes which are common to both.

Recommendations for further development

The evaluation suggests that the pilot resource is functional and well structured but that it could be extended and made more interesting. The recommendations that follow are thus concerned mainly with enhancing interactivity and further developing those sections which are seen by the business community as particularly useful.

In the course of developing, trialling and evaluating earlier resources, staff at the Telematics Centre have developed extensive expertise in the use of images, both stills and videoclips, to enhance and extend education and training. The strategies for using images have proved to be successful in parts of the pilot version where this approach has been used. It is planned to extend this across the resource; for example, more images will be included. Some of these will be made active to provide further information (which may also be image-based) about the content or context being depicted as has been done for the health and safety sub-section. Similarly, the sub-section on the analysis of strengths and weaknesses presents an active grid. At the moment each part of the grid activates a text screen. The development team would also like to include visual exemplification or an embedded activity or task.

Interviews were undertaken with a number of people following ICT training, as well as with training providers. Extracts from those interviews, offered as sound bytes, will also be added to the resource to illustrate points made in the text.

Given the importance of needs analysis (a view supported by most users of this resource), this section needs to provide a much more comprehensive coverage of the area. A diagram could be included with the list of characteristics of a good needs analysis and perhaps some sample questionnaires and audit tools. One pilot user suggested including a means of showing competence in ICT skills relative to job profiles. Another suggested a self-diagnostic tool and/or a task to help users determine their own learning preferences and styles.

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The visual glossary demonstrates an approach to the explanation and clarification of terms. The pilot sought to discover people's comments on this approach in order to inform further development and breadth of coverage. As the approach was generally valued by the business users, there is scope for developing it further and for incorporating some interactivity and cross-referencing.

The case studies were seen as useful, and it is felt some should be reviewed in order to show more of the trainee's view of the experience, and the impact the training had on their business. It was also felt the examples should be made more interactive in order to show them as they operate in their own right. For example:

- The plan of the Virtual Study Centre in everyday use is a 'clickable image', used to navigate the environment. More of this realism needs to be made available in the *Ensuring Effectiveness of ICT Training* resource to allow active site access to each of the rooms (rather than a next screen sequence). This could be achieved through an activity or task embedded in each so that the user can get an idea of how the Virtual Study Centre actually works.
- actS shows 'test yourself' and 'self analysis' facilities which are active in the real course. It was felt they should be made active in this case study.

It was suggested that navigation could be enhanced by adding 'previous' and 'next' arrows. More cross-referencing links also needed to be considered, though it was appreciated that any additional cross-referencing must be carefully thought through or it could result in users feeling 'lost' in the resource. A ' resource map' icon is now under consideration to address this issue.

There is always a problem of updating a CD-ROM resource and some business users in the pilot study asked for live links to relevant web sites. Some such sites are given in the references, but at present do not operate as live links. Updates and additional material can also be offered on-line. Both of these matters could be resolved if a version of the resource were offered on-line. In this case a 'print the page' facility would offer further flexibility.

Finally, as was noted above, the benefits of developing transferable skills are difficult to track through conventional models of cost-benefit analysis. At the same time, government initiatives are encouraging the development of transferable skills. These initiatives include the University for Industry which will involve the creation of a national multimedia learning network, the Investors in People Standard which links investment in training to the needs of businesses, and skills accreditation through Training and Enterprise Councils and the National Vocational Qualifications Framework. These proposed networks, as well as existing ones, could be used as a means of disseminating these materials to a wider audience. Accreditation could also provide a major incentive for using the resource.

Conclusion

Ensuring Effectiveness of ICT Training is a functional resource developed in an area where there is a paucity of good-quality multimedia, i.e. it addresses the training

process and does not attempt to carry out any ICT skills training. It has been piloted in a limited number of business settings and its value has been acknowledged. It could be improved with further development of its interactive and multimedia elements and by extending the content signalled by the users as being particularly useful.

The process of developing the resource has resulted in many new links being established several of which look set to lead to further collaboration beyond the life of the project. The work has provoked discussion and reflection within and between business and education communities and undoubtedly has been a valuable learning experience and training activity in its own right.

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